

11. Current in a magnetic field

Please remember to photocopy 4 pages onto one sheet by going A3→A4 and using back to back on the photocopier

2016 Question 12 (b) [Ordinary Level]

The diagram shows a bar magnet.



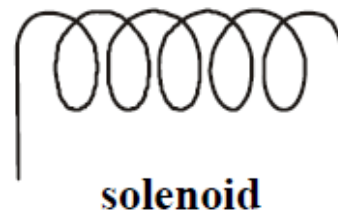
- (i) Copy the diagram and show on it the magnetic field lines around the magnet.
- (ii) Describe an experiment to plot the magnetic field lines around the magnet.
- (iii) Name a metal that is attracted to a magnet.
- (iv) State two practical uses of a magnet.

2013 Question 8 (b) [Ordinary Level]

- (i) A magnetic field exists about a current-carrying conductor.
What is a magnetic field?
- (ii) Describe an experiment to show that a long straight wire carrying a current has a magnetic field.
- (iii) Sketch the magnetic field.
- (iv) Give an application of the magnetic field due to a current.

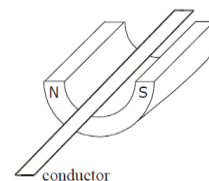
2006 Question 10 (b) [Ordinary Level]

- (i) What is a magnetic field?
- (ii) Describe an experiment to show the magnetic field due to a current in a solenoid.
- (iii) A solenoid carrying a current and containing an iron core is known as an electromagnet.
Give one use of an electromagnet.
- (iv) State one advantage of an electromagnet over an ordinary magnet.



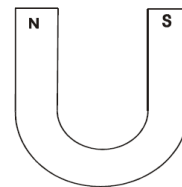
2003 Question 9 [Ordinary Level]

- (i) What is a magnetic field?
- (ii) The earth has a magnetic field. Give one use of the earth's magnetic field.
- (iii) Hans Oersted discovered the magnetic effect of an electric current in 1820 while demonstrating electricity to his students. Describe how you would demonstrate the magnetic effect of an electric current.
- (iv) Draw a sketch of the magnetic field around a straight wire carrying a current. Your diagram should show the direction of the current and the direction of the magnetic field.
- (v) In an experiment, a thin light conductor is placed between the poles of a U-shaped magnet as shown in the diagram.
Describe what happens when a current flows through the conductor.
- (vi) Name two devices that are based on the effect demonstrated in this experiment.
- (vii) What would happen if (i) a larger current flowed in the conductor, (ii) the current flowed in the opposite direction through the conductor?



2002 Question 12 (d) [Ordinary Level]

- The diagram shows a U-shaped magnet. Copy the diagram and show on it the magnetic field lines due to the magnet.
- Describe an experiment to demonstrate that a current-carrying conductor in a magnetic field experiences a force.
- List two factors that affect the size of the force on the conductor.
- Name one device that is based on the principle that a current-carrying conductor in a magnetic field experiences a force.

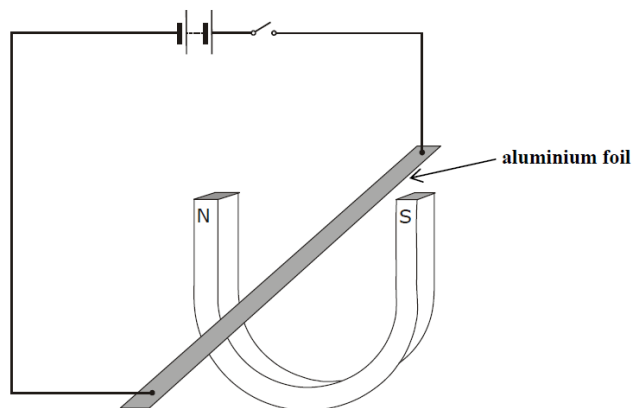


2006 Question 10 (a) [Ordinary Level]

The diagram shows an experiment to demonstrate that a current-carrying conductor experiences a force in a magnetic field. A strip of aluminium foil is placed at right angles to a U-shaped magnet. The foil is connected in series with a battery and a switch.

When the switch is closed the aluminium foil experiences an upward force.

- Name a device based on this effect.
- Describe what will happen if the current flows in the opposite direction.
- Describe what will happen if a larger current flows through the aluminium foil.
- Describe what will happen if the aluminium foil is placed parallel to the magnetic field.
- Calculate the force on the aluminium foil if its length is 10 cm and a current of 1.5 A flows through it when it is placed in a magnetic field of flux density 3.0 T.



2010 Question 11 [Ordinary Level]

Read this passage and answer the questions below.

In 1819 the Danish physicist Hans Christian Oersted discovered that an electric current flowing through a wire deflected a compass needle.

A year later the Frenchman François Arago found that a wire carrying an electric current acted as a magnet and could attract iron filings. Soon his compatriot André-Marie Ampère demonstrated that two parallel wires were attracted towards one another if each had a current flowing through it in the same direction. However, the wires repelled each other if the currents flowed in the opposite directions.

Intrigued by the fact that a flow of electricity could create magnetism, the great British experimentalist Michael Faraday decided to see if he could generate electricity using magnetism. He pushed a bar magnet in and out of a coil of wire and found an electric current being generated. The current stopped whenever the magnet was motionless within the coil.

- Who discovered that an electric current can deflect a compass needle?
- What did Arago discover?
- What happens when currents flows in the same direction in two parallel wires?
- How could two parallel wires be made to repel each other?
- Draw a sketch of the apparatus Michael Faraday used to generate electricity.
- What name is given to the generation of electricity discovered by Michael Faraday?
- What energy conversions that take place in Faraday's experiment
- How does Faraday's experiment show that a changing magnetic field is required to generate electricity?

2009 question 9 [Ordinary Level]

(i) A magnetic field exists in the vicinity of a magnet.

What is a magnetic field?

(ii) Describe an experiment to show the shape of the magnetic field around a U-shaped magnet.

(iii) The diagram shows a compass placed near a wire connected to a battery and a switch.

Why happens to the compass when the switch is closed?

(iv) What does this tell you about an electric current?

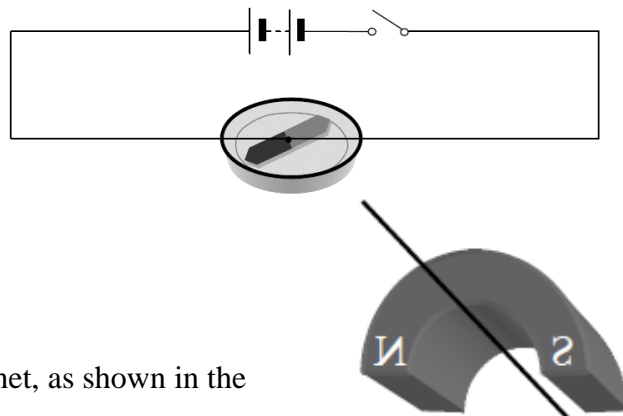
(v) What happens to the compass when the switch is opened?

(vi) The wire is then placed between the poles of a U-shaped magnet, as shown in the diagram.

Describe what happens to the wire when a current flows through it.

(vii) What would happen if the current flowed in the opposite direction?

(viii) Name two devices that are based on this effect.



2017 Question 9 [Ordinary Level]

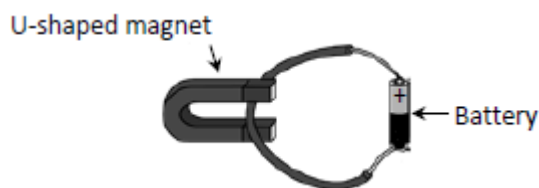
Magnetic fields can be detected near a magnet or a current-carrying conductor.

(i) What is a magnetic field?

(ii) State one example of a good conductor and one example of a good insulator.

(iii) Name the unit of voltage.

The diagram below shows a wire placed between the poles of a U-shaped magnet.

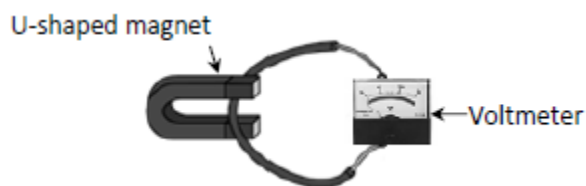


(iv) What happens to the wire when current flows through it?

(v) What happens when the direction of the current is reversed?

(vi) Name one device based on this effect.

The wire is then disconnected from the battery and connected to a sensitive voltmeter.



(vii) What is observed on the voltmeter when neither the wire nor the magnet move?

(viii) What is observed on the voltmeter when either the wire or the magnet is moved?

(ix) Name a scientist whose law is associated with this phenomenon?

(x) Magnetism is one effect associated with an electric current.

(xi) Name one other effect.